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BRITISH JOURNAL OF HERPETOLOGY

THE RUDIMENTARY LIMBS IN ANILIIDAE (SERPENTES)

By

MARIAN MLYNARSKI and ZDZISLAW MADEJ

INTRODUCTION

The Aniliidae form a small and archaic group of snakes having a very disjunctive distribution. Their systematic position is not clear and, as Dowling (1959) remarks, is an important problem for investigation.

The occurrence of rudimentary hind limbs together with some fragments of the pelvic girdle constitute a well known and undoubtedly primitive feature of this group. One of the earliest workers to describe these rudimentary limbs was Mayer (1825). This author regarded the Aniliidae as intermediary between the "Phenopoda" and the "Cryptopoda". He examined a number of specimens (species?) of the genera *Cylindrophis* Wagler and *Anilius* Oken referred to by the author as *Tortrix* Oppel. According to Mayer the skeleton of the hind limbs of *"Tortrix"* consists of an "os cruris" built analogously to that in a boa and of the "tarsal" and "metatarsal" bones. He gave a detailed description of the position of the organs in the skin, as well as of a little cavity, in which a protrusible claw borne on the "metatarsus" is embedded. The musculature of the limbs is described as being exactly like that in boas, owing to which, the claw can be protruded outside and withdrawn (Tab. 67, Figs. 5, 6 and 7). Mayer was the first to state the differences shown by the organs in question in various specimens examined by him. He describes, for instance, the advanced development of bones and strong claws in *Tortrix corallinus* [*?Anilius scytale* (Linnaeus)] and points out the advanced development of the "ossa tarsi" in *Tortrix rufus* [*Cylindrophis rufus* (Laurenti)], which conforms to our observations. The "tarsal" bones are less developed in *Tortrix scytale* [*Anilius scytale* (Linnaeus)], the "metatarsal" bone being here stronger and more massive. Mayer found no vestiges of limb bones in *Tortrix tesselatus* [*Anilius scytale* (Linnaeus)], which suggests that he may have dealt with a female.

C. K. Hoffmann (1890) contributed nothing new to the subject. Other similar works, being handbooks based on older sources, are also of little value. Some interesting details concerning the hind limbs in *Anomochilus* have been recently published by Smith (1940) and by Brongersma & Helle (1951). The valuable work of these authors will be discussed in the later part of this paper.

The rudimentary hind limbs in the Boidae are considerably better known. Out of many works devoted to this subject we may cite the studies of Stickel & Stickel (1946) on the sexual dimorphism shown by the structure of the hind limbs. Hoge (1947) demonstrated the sexual differences on rich statistical material. The observations of these authors complete the observations made by Carlson (1887) and Berlin (1958). Lately Bellairs (1950) discussed the previous, more important works on the rudimentary hind limbs in snakes, and described the hind limbs and their musculature in *Trachyboa boulengeri.*

Hind-limb rudiments of Aniliidae, in side view.

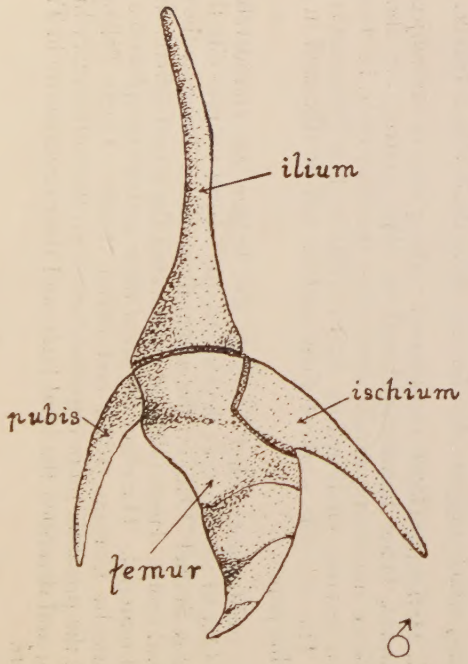

Fig. 1.

Cylindraphis rufus (left)

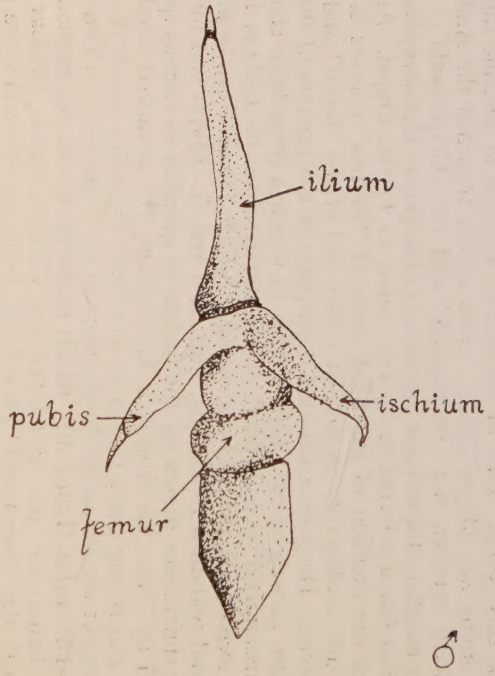

Fig. 2.

Cylindrophis maculatus

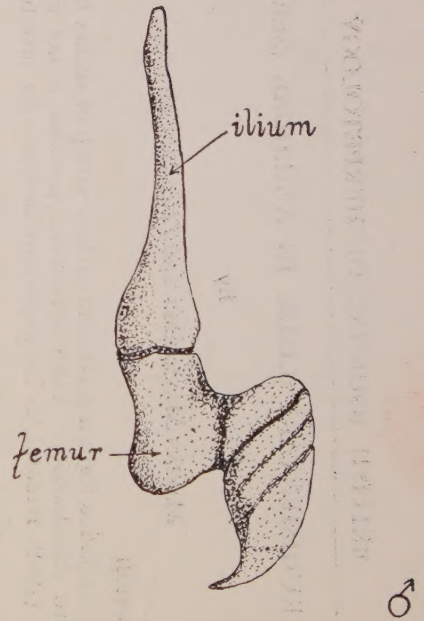

Fig. 3.

Anilius scytale (left)

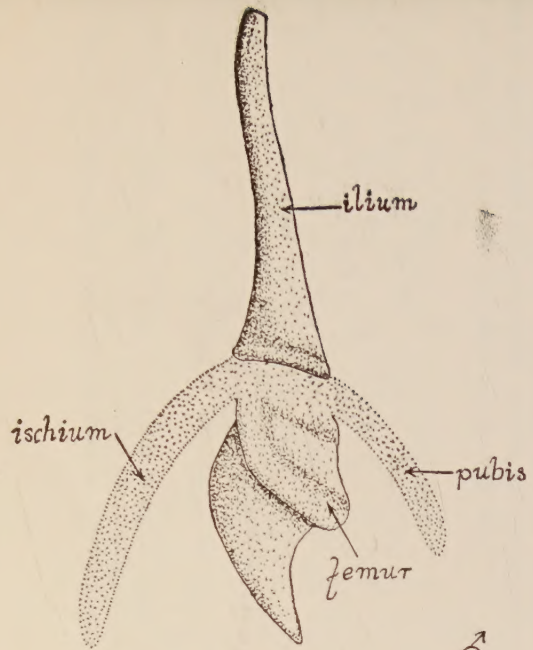

Fig. 4.

Anilius scytale (rt.)

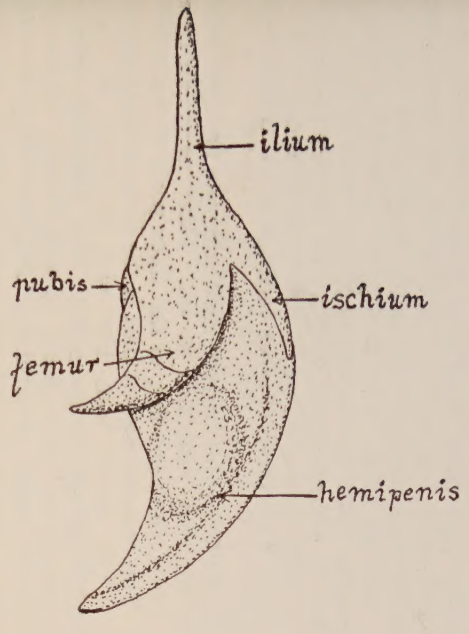

Fig. 5.

Cylindrophis rufus (left)
Showing a Hatched hemipenis
(whole of large curved structure)

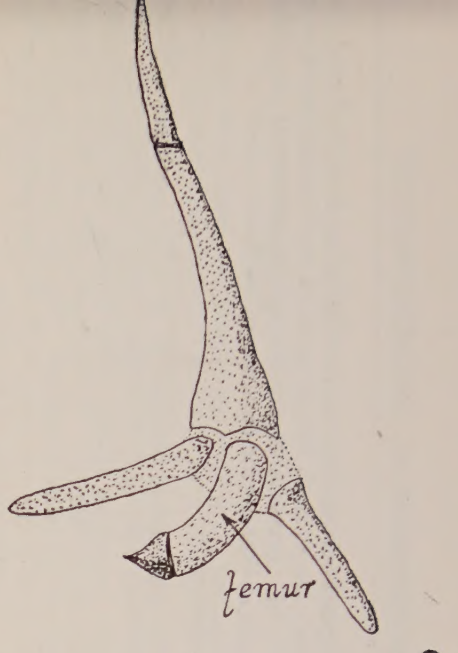

Fig. 6.

Anomochilus weheri (left)
(after Brongersma and Helle)

We wish to express our gratitude to Dr. H. Wermuth of the Zoological Museum in Berlin, to Dr. P. E. P. Deraniyagala of the National Museum of Ceylon, and to Dr. M. Gasowska of the Zoological Institute of the Polish Academy of Sciences in Warsaw for donation of material.

Material and Methods

The material at our disposal consisted of ten adult specimens of snakes of the family Aniliidae: four of *Cylindrophis rufus* (Laurenti) from Java, one of *Cylindrophis maculatus* (Linn.) from Ceylon, and five of *Anilius scytale* (Linn.) from South America. All this material was very old, dating back to 1860-1890, and preserved in alcohol. The poor state of preservation made it impossible to study the soft parts, and only the skeleton, which was prepared by boiling, could be examined thoroughly.

Description of Material

The rudimentary hind limbs have been preserved only in certain primitive groups, the Boidae, Typhlopidae, Leptotyphlopidae and Aniliidae. Owing to their loss of supporting and locomotor functions the limbs have lost direct contact with the spine. The description of the limbs of snakes presents many difficulties since the homologies of their particular parts have not been established by embryological studies. In the case of the pelvis, however, at least in some snakes, we may assume that its various parts are homologous with those of the pelvis of other vertebrates, and use the corresponding terminology.

The male *Cylindrophis rufus* has the most complete and well ossified skeleton of all the Aniliidae examined by us. Three parts can be distinguished in the pelvis, corresponding to the three parts of the pelvis in other vertebrates. The first and longest part is the ilium, with its free end directed cranially. The second bone, least well developed, lies ventro-caudally and must be regarded as the pubis. The third one, somewhat longer, lies dorso-caudally and corresponds to the ischium. These bones meet and are joined by means of cartilage. All these elements form a support for the shaft of the best developed, though not longest bone, which should be considered to be the femur. The free end of the femur is covered with a claw (Fig. 1). The claw is embedded in the skin, and only its tip is protrusible outside.

The limbs of the female of this species resemble those of the male as far as morphology is concerned. However, all the elements are smaller and less well ossified. The claw is present, but is very small; it is embedded in the skin and does not project from it. It was noted that although the size of the female examined considerably exceeded that of the male whose skeleton has been prepared, limbs of the former were much smaller. The small size and slight ossification of the limbs and, above all, bad preservation of the very old material rendered it impossible to make preparations of either of two female specimens in our possession and consequently to make a drawing.

The build of the limbs in the male *Cylindrophis maculatus* differs only slightly from the rudimentary bones in *C. rufus*. The differences concern the degree of development of particular bones, their position in relation to

each other and the shape of the claw. Moreover, the claw does not project outside but is entirely embedded in the skin. These differences are shown n Fig. 2. No female of this species was examined.

The limbs of *Anilius scytale* are most reduced (Fig. 3). In the male only one pelvic bone, the ilium, has remained. The femur is provided with a well developed claw at its free end and is joined with the ilium directly by synchondrosis. The claw is composed of two horny layers. The internal layer is adherent to the bone, the other, external, is coalesced with the skin, and the claw cannot be protruded outwards.

The build of this part of the limb suggests that the outer part of the free limb is here present, but completely fused with the inner or femoral part. Embryological study is required to make the final statement.

The female *Anilius scytale* does not show any definite limb structures. A few tiny bones, indefinite in shape, were found, but even these were present only in one of the two specimens examined.

In our material there is a specimen collected and identified as *Anilius scytale* (Linnaeus) by Konstanty Jelski in Cayenne (Guiana) in 1866. The limbs present in this specimen much resemble those in *Cylindrophis rufus*. The differences concern chiefly the degree of ossification. Whereas the ilium and femur are rather well ossified, the remaining parts, i.e., the ischium and pubis, are cartilaginous (Fig. 4). The claw does not project outside, just as in the typical representatives of the genus *Anilius*. Besides the differences mentioned above we were able to notice a number of morphological features in this specimen diverging from the respective features in typical individuals. Those may be only individual deviations. The specimen, however, deserves a more careful analysis, which is beyond the scope of this paper.

Discussion

The dimorphic differences in the degree of development and in the build of the limb rudiments occur in Aniliidae, just as they have been described in Boidae (Stickel & Stickel, 1946; Hoge, 1947) and Leptotyphlopidae (Essex, 1927). The limbs are best developed in the genus *Cylindrophis*. In the male of this genus the rudimentary bones undoubtedly play an auxiliary role during copulation. Davis (1936) suggests that the analogous claw in a boa is used to stimulate the cloacal region of the female before coitus. Boulenger (1913) believed that in boas the claws serve to clasp the female at copulation. Our observations on *Cylindrophis rufus* permit us to suggest another hypothesis—that the limbs in the male of this species help to insert the hemipenis into the cloaca of the female. This suggestion is supported by the fact that the limbs are directly connected with the hemipenis, as is shown in our preparation (Fig. 5). This does not exclude the stimulating function attributed to the claws in boas by Davis. Our hypothesis should be checked on fresh material permitting examination of the soft parts, especially of the muscles.

Owing to their greater reduction, the limbs of *Anilius* cannot have a stimulating function. The claws in all the specimens studied are not protrusible outside the body. The presence of limb rudiments with claws embedded in the skin has been described in several specimens of *Anomochilus weberi* (Lidh.), but not in *A. leonardi* (Smith) (see Brongersma and Helle, 1951).

As in Boidae, the limbs of female Aniliidae are, as a rule, considerably more reduced than those of the males. This reduction, especially in *Anilius*, may be associated with their lack of functional importance. The case of a perfect development of the rudimentary limbs in a female *Anomochilus weberi* described by Brongersma and Helle is so far unique; possibly it represents a deviation caused by a disturbance in the formation of the tertiary sexual characters. (Fig. 6)

Even on the basis of the poor material at our disposal it is possible to state the distinct generic and specific differences in the members of the Aniliidae, as has been pointed out in the descriptive part of this paper. Certain slight differences which can be found in particular specimens, are to be regarded as individual variations, With regard to the differences in the morphology of the limbs, Romer (1956, p. 570-571) divided the members of the family Aniliidae (in the sense of Amaral, 1935, not of Romer op cit.) into the sub-families Aniliinae (containing only *Anilius*) and Uropeltinae (including *Anomochilus, Cylindrophis* and the Uropeltidae of other authors).

A number of apparent resemblances can be found between the structure of the rudimentary limbs in the Boidae and Aniliidae. For example, the limbs of *Anilius scytale* resemble those of the neotropical *Boa constrictor,* both in the case of the males and the females (Hoge, 1947). The limbs of the male of the Asiatic *Cylindrophis rufus* have the same type of structure as the central American *Trachyboa boulengeri* (see Bellairs, 1950). It is probable that the resemblance of the limbs of Aniliidae and Boidae points to parallel evolution rather than to direct relationship.

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THAPARIA CAPENSIS n.sp., AN OXYUROID PARASITE OF TESTUDO ANGULATA

By

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Introduction

Oxyuroid nematodes or roundworms abound in all the land tortoises and belong to several genera. The genus *Thaparia* is of interest because of its unusual distribution. Thus, although the parasites of tortoises have already been fairly well studied, only three species of the genus *Thaparia* are known. Two, including the species described below, are from tortoises inhabiting the southernmost extremity of Africa, viz., *Testudo verreauxi* and *T. angulata,* and one is from a giant land tortoise from the Galapagos Archipelago. Similarly, the Oxyuroid genus *Labiduris* has so far only been reported from *Testudo denticulata* (syn. *T. tabulata*) in Brazil and from *Kinixys erosa* in the Belgian Congo. What are the reasons for these limited and extraordinary distributions? We do not know, but the question must be at least as intriguing for the herpetologist as it is for the helminthologist since it concerns the host animal as much as it does the parasite.

Suborder *Oxyurata* Skrjabin, 1923.
Superfamily *Oxyuroidea* Railliet, 1916.
Family *Oxyuridae* Hall, 1916.
Subfamily *Syphaciinae* Railliet, 1916.
Genus *Thaparia* Ortlepp, 1933.
Thaparia capensis n.sp.

General Description

Both sexes are represented but the specimens are not very plentiful in the host examined, the total material consisting of only two males and three females, all apparently mature. The males are shorter and more slender than the females; the oesophagus is fairly short and in two distinct parts; the long spicule is a striking feature; there are no lateral alae.

The head is set-off from the rest of the body by a slight constriction or neck. There are three flattened lips, the latero-ventral lips each bear an amphid on their dorsal half. Each of the lips appears to be supported by a pulp-like structure but no papillae are discernable. Next to the inner surface of each lip and inserted on the anterior end of the oesophagus there is a triangular flange-like process thickened in the middle and pointed at its apex which usually protrudes beyond the anterior margin of the lip. There is no buccal capsule and no pharynx. The oesophagus consists of a corpus, an elongated isthmus, and a bulb, all characteristic of the genus. The intestine is straight and the rectum fairly long. The nerve-ring surrounds the corpus of the oesophagus in its posterior half. The excretory pore is situated well behind the level of the oesophageal bulb in both sexes.

Male : The male attains its maximum width at about the middle of the body. Its posterior extremity is deeply cut-out ventrally behind the anus and continues as a dorsal finger-like process. The caudal alae are broad

and well-developed and extend from just anterior to the anal group of papillae to just anterior to the terminal pair of papillae. There is a pair of lateral phasmids within the alae at about the junction of the posterior and middle thirds of the caudal process. There are three pairs of papillae in the vicinity of the anus, two large pre-anal pairs, one closely approximated and ventral in position, the other more widely separated, lateral in position, bearing a postero-medially directed finger-like process, and an adanal pair smaller than the two pre-anal pairs, ventral in position and situated on either side of the anus. There is a fourth pair of papillae situated on the corners of the posterior extremity of the caudal process. The spicule is characteristic of the genus, very long and with a hyaline flattened tip which is not bifid. It is somewhat variable in length in the two specimens examined, but is at least half the total body length. The accessory piece is V-shaped and easily seen. The testis extends to within a short distance of the excretory pore and then is reflected and runs a short distance in a posterior direction to its apex.

Female : The female attains its maximum width at about the middle of the body. The tail is conical and sharply pointed; it is about 1/9th of the total body length. The vulva is at, or slightly posterior to, the middle of the body. Its lips are not in themselves conspicuous but its opening is covered by a flap which is inserted anterior to it and which is bilobed. The posterior lip bears a spine-like process which corresponds to the division between the lobes of the flap. The vagina is about 0.16mm. long, thick and muscular. It runs forward to connect with the ovejector through a papilla-like sphincter. The ovejector is thick-walled and shaped like an inverted U (i.e., the genital canal, after running forward from the vulva, is later directed backward), it is about 0.32mm. long and is thickest at its junction with the vagina and it gradually narrows until it reaches the thin-walled, large, ovoid swelling of the *receptaculum seminis*. From the latter the unpaired limb of the uterus runs back in a winding manner and is about 0.76mm. long. The two uterine branches are at first opposed but later run parallel. The two ovaries are very long and winding and extend between the levels of the vulva and oesophageal bulb. The eggs are not plentiful and contain a morula when laid.

Specific Diagnosis

Male : Length, 2.87—3.45mm.; average, 3.18mm.; greatest width, 0.15—0.20mm.; average, 0.17mm.; length oesophageal corpus, 0.16mm.; length of isthmus and bulb of oesophagus, 0.21—0.25 mm.; average, 0.23mm.; head-nerve ring distance, 0.11mm.; head-excretory pore distance, 0.77mm.; cloaca-tail tip distance, 0.085—0.090mm.; average 0.087mm.; spicule length, 1.82—2.72mm.; average, 2.16mm.; accessory piece length, 0.04mm.
Female : Length, 5.2—5.6mm.; average, 5.37mm.; greatest width 0.52—0.53mm.; length of oesophageal corpus, 0.20mm.; length of isthmus and bulb of oesophagus, 0.40—0.41mm.; head-nerve ring distance, 0.13—0.15mm.; average, 0.14mm.; head-excretory pore distance, 1.33—1.35mm.; average, 1.34mm.; vulva-tail tip distance, 2.62—2.83mm.; average 2.74mm.; anus-tail tip distance, 0.27—0.30 mm.; average, 0.29mm.; dimensions of egg, 0.12 x 0.06mm.

Host : *Testudo angulata* (Schweigger).
Location : Large intestine and caecum.
Locality : Cape Town, Western Cape Province, South Africa.
Types : In London School of Hygiene and Tropical Medicine.

Affinities : This worm most closely resembles the type species *Thaparia macrospiculum* Ortlepp, 1933, in fact it is impossible to find any real point of difference in the caudal extremities of the male of the two species; the spicule, however, is slightly shorter in the new species and it never extends anterior to the oesophageal bulb. The female can easily be distinguished from those of *T.macrospiculum* and of *T. contortospicula* Walton, 1942, by the much more anterior position of the vulva. Another point of difference exists in the armature of the mouth; in *T. macrospiculum* and *T. contortospiculum* it is confined to the inside of the dorsal lip, whereas in *T. capensis* all three lips are armed.

Key to the Species of the Genus *Thaparia* Ortlepp, 1933.

1 :	Posterior extremity of tail of male produced into a pointed process, spike-like	*T. contortospicula* Walton, 1942.
	Posterior extremity of tail of male rounded, not spike-like ...	2.
2 :	Vulva situated at, or only slightly behind, mid-point spicule 1/1.27 to 1/1.57 of total body length	*T. capensis* n.sp.
	Vulva near anus; spicule longer, 1/1.14 to 1/1.28 of total body length	*T. macrospiculum* Ortlepp, 1933.

Discussion on the Genus *Thaparia.*

The generic diagnosis as amended by Walton (1942) should now be altered to read, "Vulva may be in the middle of the body but is usually in the posterior half of the body, sometimes closely approximating the anus in position", instead of "Vulva in the posterior half of the body, sometimes closely approximating the anus in position". Also "Vagina very long" should be removed from the generic diagnosis since it is no longer true for all members of the genus as that of the new species is not remarkably long.

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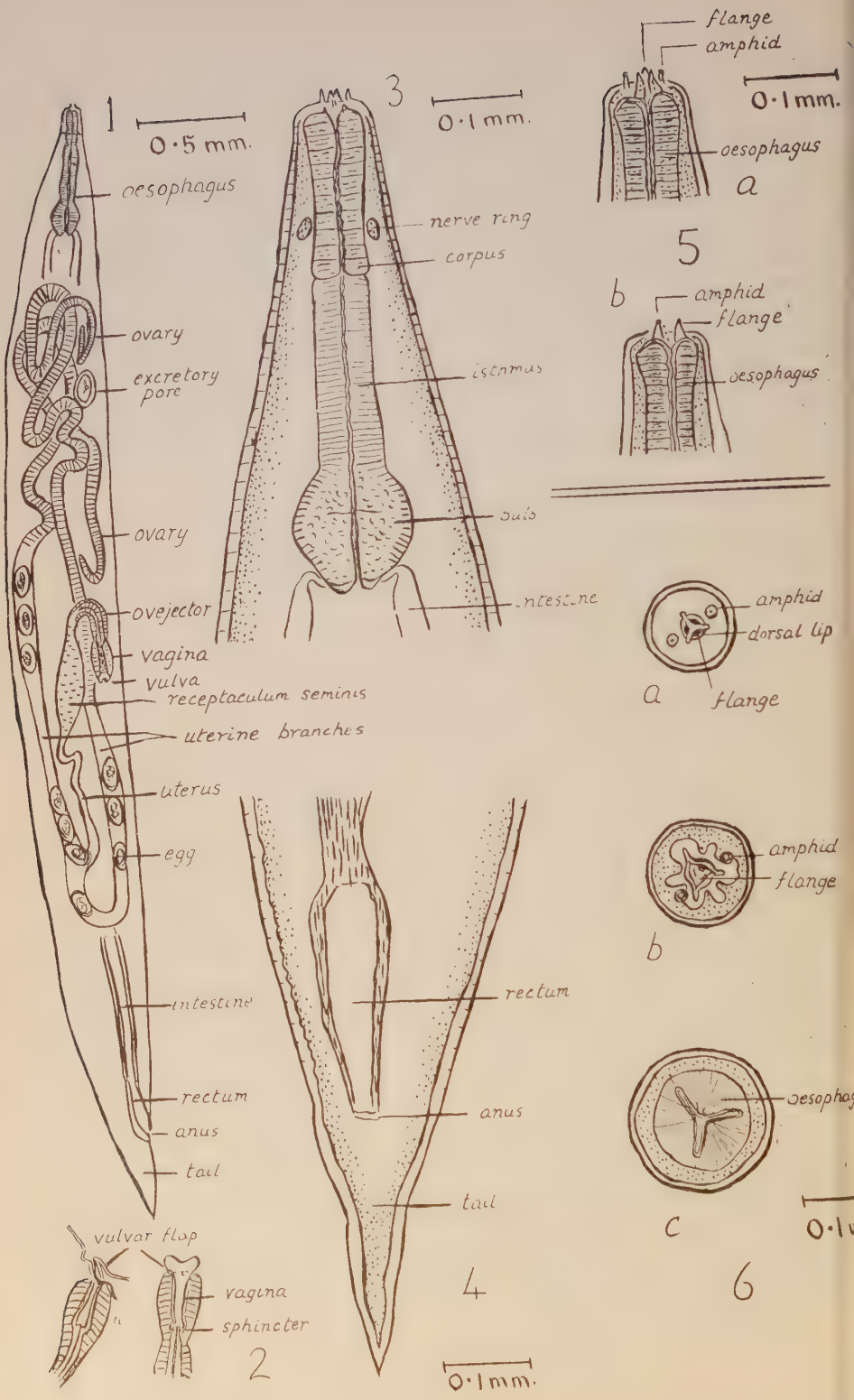
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0·5 mm.
oesophagus
ovary
excretory pore
ovary
ovejector
vagina
vulva
receptaculum seminis
uterine branches
uterus
egg
intestine
rectum
anus
tail
vulvar flap
vagina
sphincter
2
3
0·1 mm.
nerve ring
corpus
isthmus
bulb
intestine
4
0·1 mm.
rectum
anus
tail
flange
amphid
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oesophagus
a
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b
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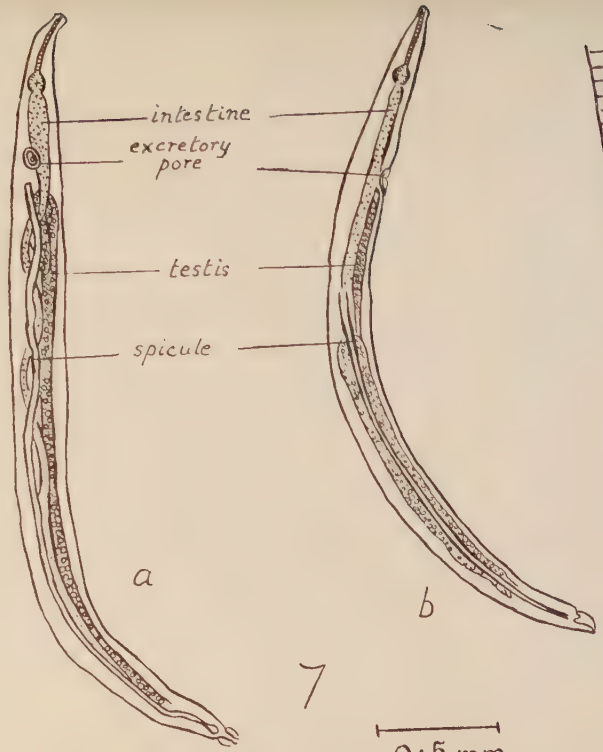

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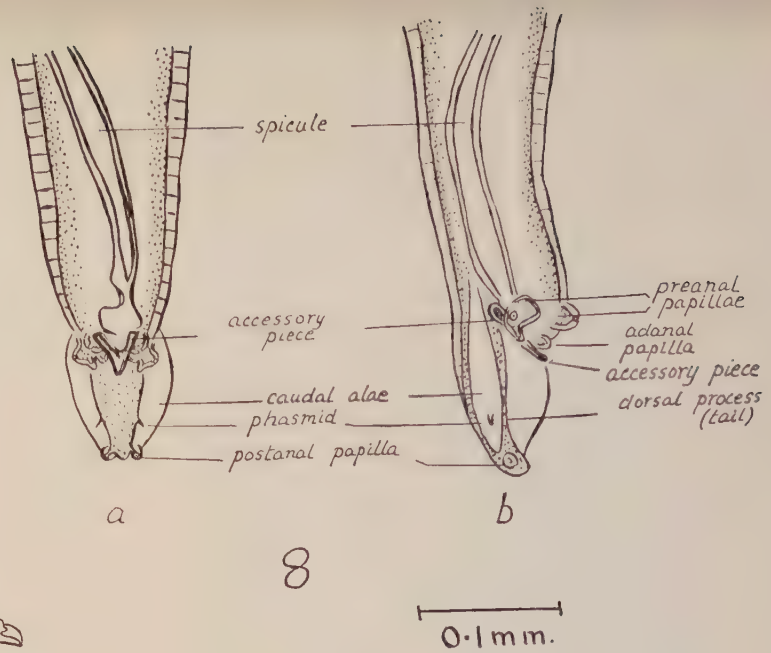

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For explanation see page 12

Explanation of figures of *Thaparia capensis*:—

1. Adult female, latero-ventral view.
2. Detail of structure of vulvar flap. (*left*) lateral optical section. (*rt*) ventral view.
3. Anterior extremity of oesophageal region, dorsal view.
4. Female, posterior extremity, ventral view.
5. Cephalic extremity. (a) ventral view. (b) lateral view.
6. Cephalic extremity, en face. (a) superficial aspect. (b & c) at progressive depths of optical section.
7. (a. & b) two different males, showing variation in spicule length. (a) ventral view. (b) lateral view.
8. Male, posterior extremity. (a) ventral view. (b) lateral view.

Commonwealth Bureau of Helminthology, St. Peter's Street,

St. Albans, Herts.

NOTES ON AMPHISBAENIDS (AMPHISBAENIA: REPTILIA)*

On the name *Amphisbaena reticulata* Holmer, 1787.

By

Carl Gans

Holmer (1787, p. 30) described the new species *Amphisbaena reticulata* in a footnote to a very rare dissertation, generally cited under the name of Carl Peter Thunberg who examined the candidate. The species was mentioned in Donndorff's (1798, p. 221) addenda to the 13th edition of the *Systema Naturae* and for the third and last time by Merrem (1820, p. 160). It is not referred to in Boulenger's (1885) *Catalogue of lizards,* nor in Sherborn (1930).

The original description read: "Annulis 130 : 21. Supra rubicundà, subtus alba, pulcherrime reticulata, vitta utrinque alba". (Reddish above, white below, with reticulate markings, a lateral white line.) No locality was given and no type designated.

There is no reason to doubt that an amphisbaenid was involved as the collection also contained specimens of *A. alba* and *A. fuliginosa.* The only amphisbaenids that have fewer than 140 body annuli are *Trogonophis wiegmanni* Kaup, 1830, *Agamodon anguliceps* Peters, 1882, and the four species of *Blanus.* Of these only *Blanus cinereus* (Vandelli), 1797, has more than 20 caudal annuli (Loveridge, 1941, p. 372). The dorsal colour of this species may often be reddish brown (= *cinereus*) and the ventral surface is light. The dorsal colour is restricted to the segments and intersegmental

* It is intended to use this running title for a series of short papers dealing primarily with nomenclatorial or taxonomic problems. Many of these will deal with redescription of poorly-known species or descriptions of new forms prior to the appearance of a check-list now in preparation. Comments on the relations of the several species will be presented after the appearance of the check-list.

reas may be faded presenting the superficial appearance of a reticulated attern. Specimens examined by me have a deeply inserted lateral groove f a lighter colour, thus explaining the lateral white line or stripe, otherwise unique feature in an amphisbaenid. *Blanus cinereus* is distributed through pain, Portugal, Tangiers, Morocco and Algeria (Loveridge, 1941, p. 373) nd Holmer may well have had a specimen in the Upsala collection.

The specific name *cinereus* has been exclusively used since long before he appearance of Boulenger's catalogue. It would be foolish to change the ame of this well-known form on which much morphological, physiological nd other work has been done. Consequently a petition for its retention as been submitted to the International Commission for Zoological Nomenlature.

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APPARENT FAILURE OF TOOTH REPLACEMENT IN MONITOR LIZARDS

Addendum

By

A. d'A. Bellairs and A. E. W. Miles

In a recent number of this journal we described a massive almost toothless monitor lizard skull obtained by Dr. F. R. Parrington in Tanganyika (*Brit. J. Herpetol.*, 1960, *2*, 186). Professor Robert Mertens of the Senckenberg Natur-Museum, Frankfurt am Main, has subsequently written to us about it. He states that the skull belongs to a gigantic specimen of *Varanus exanthematicus microstictus,* or to a closely related form, *V. e. albigularis,* and not to a *V. niloticus* as we had supposed. *V. exanthematicus* resembles *V. niloticus* in the tendency to develop stumpy teeth and in the bowing of the lower jaw, but differs from it in such features as the shape of the maxilla and the relatively greater width of the skull. We are most grateful to Prof. Mertens for correcting this identification. Dr. Parrington has now kindly presented the skull to the British Museum (Natural History).

V. exanthematicus seldom exceeds a metre and a half in length, but Prof. Mertens informs us that he has heard of an East African specimen at least 2 metres long. He also has in his collection a lower jaw of *V. e. microstictus,* the characteristic East African form, of c. 12.2 cm. length, only about 2 cm. shorter than that of the skull described by us.

Prof. Mertens has also been kind enough to lend us the skull of an Australian monitor lizard, *Varanus spenceri,* which he has described and figured in a recent article (in *Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich,* Jahrg. *104,* Festschrift Steiner 1959, 115). The dentition of this specimen is very incomplete, although it shows no evidence of being particularly aged. In the upper jaw there are only five anchylosed teeth, all on the premaxilla, and there are only four teeth on each dentary (one broken). Seven more teeth, detached from the specimen during preparation, were also with the specimen.

Each maxilla is devoid of anchylosed teeth but shows a series of smooth shallow depressions rather similar in appearance to those in the large skull, now identified as belonging to *Varanus exanthematicus,* and to those of the *V. gouldii* skull in the U.S. National Museum which we previously described.. Similar depressions are also present on the toothless regions of the dentaries, but on one of these there are also the obvious remains of a broken tooth base. Of the seven detached teeth, one can be identified as having been anchylosed to this broken base; the remaining six can be accounted for on one of the assumptions :—

(a) that they had been firmly anchylosed to the jaw but had been detached without leaving obvious traces, or

(b) that they were not originally firmly anchylosed, being either in the process of replacement or of being shed—or a combination of (a) and (b).

Both of these alternative explanations for toothlessness were discussed in our previous article. Study of this specimen of *Varanus spenceri,* however, has naturally led us to reconsider our view that the most probable explanation of the condition was a failure of tooth replacement in old age.

Unfortunately it is not possible to reach a definite conclusion on the matter. The possibility that the huge *V. exanthematicus* described by us originally had anchylosed teeth which became detached without leaving traces seems unlikely. After prolonged maceration of the jaws of several varanids it was impossible to break off the teeth without leaving jagged bases easily distinguishable from the shallow depressions in the specimens described. It was, however, possible to produce such depressions artificially if the bone, when still wet, was scraped until traces of the jagged base were removed. Dr. Parrington tells us that his specimen had been prepared by a careful preparator in this country, and it is most unlikely that it had been subjected to over-vigorous treatment.

The second alternative, that the lizards showed at the time of death a condition where the greater part of the dentition was in a simultaneous phase of replacement, must apply to the Mertens specimen of *V. spenceri* at least. Whether it applies to the *V. exanthematicus* and *V. gouldii* specimens must remain unknown. It can hardly be a common occurrence, for we have seen no other examples of it in the large number of monitor lizard skulls which we have examined. Furthermore, the mechanism of tooth replacement by alternating waves which monitor lizards are known to show tends to ensure that large regions of the jaws are not left toothless; in fact, it seems to be an adaptation to avoid the very condition which we have described. We hope that, if any further specimens showing this interesting nearly toothless condition come to light, they will be reported.

St. Mary's Hospital Medical School and
London Hospital Medical College.

NOTES ON THE ADDER AND OTHER REPTILES IN CORNWALL

By

Bryan R. Burrage

During the summer of 1954 I made a survey of the reptiles in the vicinity of Portscatho, Cornwall, from June 23rd to July 24th. The slow-worm (*Anguis fragilis*) was the most abundant reptile seen and over 50 were captured on one day; most of these were released. The largest slow-worm I captured, was a male 416 (187 + 229) mm. long. This individual was a very dark brown, almost black in colour. I also collected a 225 (101 + 124) mm. long male, which eventually developed into a blue-spotted slow-worm (var. *colchica*).

The common lizard (*Lacerta vivipara*) was the second commonest reptile. At localities where hiding places are scarce, it seems that *L. vivipara* may dig a hole for purposes of secreting itself. Opposite the Eschol House Hotel, New Road, Portscatho, I witnessed a lizard, a 155 (55 + 100) mm. long male, busily digging a tunnel. This hiding place was dug into an earth bank on the southern side of the road. The hole was 46 cm. in length, and averaged 5 cm. in width, ending in a blind and slight enlargement, presumably large enough for the lizard to curl up and rest in. The lizard dug the hole entirely with its fore feet. The soil was quite soft, having been moistened, but not soaked, by rain the previous night. Captive common lizards would dig burrows in the sand of their cages for retreats, if other hiding places were unavailable.

One grass snake (*Natrix natrix*) about three feet long was observed at Porthcurnick Beach. A smaller specimen, 312 (250 + 62) mm. long, was collected at Porthbean Beach.

The adder (*Vipera berus*) seems to be the third commonest reptile and 15 individuals were captured, measured and marked, mostly in the neighbourhood of Porthbean Beach. The following table lists the particulars of the snakes marked and recaptured during the period. The weather at the time was unusually cool and rainy and there were only a few days when the sun shone throughout the whole day.

Table concerning fifteen marked adders.

Lengths in mms.

Head & Body	Tail	Total Length	Sex	Remarks	Locality of Capture	Sub-caudal Scales marked	Times Recaptured
146	24	170	M		Porthcurnick Beach	1—1	0
214	36	250	M		Porthbean Beach	2—2	7c
180	30	210	M		„	3—3	0
386	84	450	M		„	4—4	15b
578	72	650	F	pregnant	„	5—5	20a
532	66	598	F	„	„	6—6	27a
624	76	700	F	„	„	7—7	28a
337	43	380	F		„	8—8	2b
526	74	600	F	„	„	9—9	29a
596	74	670	F	„	„	1—2	2c
612	78	690	F	„	„	2—3	5c
305	45	350	F		„	3—4	10b
622	78	700	F	„	„	4—5	27a
488	82	570	M		„	5—6	5b
429	71	500	M		„	6—7	25a

a = appeared regularly on all sunny days, warm days, and bright periods after rain.
b = appeared irregularly throughout the observation period.
c = appeared regularly for a short time, then vanished.

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EDIBLE FROGS AT ESHER

By

D. W. Yalden and P. A. Morris

Towards the end of the summer term of 1958 strange noises were heard at Black Pond*(T.Q.128623) and beyond suggesting that these were made by amphibians, nothing was done. In 1959 noises were again noted and observations with and without a telescope showed that the noises were produced by frogs. In view of the type of noise they made these were thought to be Edible frogs (*Rana esculenta*). This seemed most likely in view of the known distribution of these animals. Permission was obtained from Esher Council to capture specimens and these proved our suppositions to be correct.

First observations of the frogs showed them to be inhabiting a stretch of apparently floating weed on which they were to be seen sunbathing. The maximum number seen on any one occasion was probably about six and the whole colony possibly numbered one dozen. However, at the end of July, Council workmen (in a boat) removed much of the weed and suggested that perhaps two dozen frogs were present during this operation. Probably as a result of this disturbance later sightings were dispersed, one or more specimens being seen several times in the South Western corner of the pond. Alternatively this dispersal may have been associated with hibernation or the end of the breeding season. The Herpetological Society was informed of this colony and in their reply they suggested that the frogs probably originated in a small collection belonging to Dr. Cloudsley-Thompson, formerly of Lower Green, Esher. When questioned, Dr. Cloudsley-Thompson said that he had in fact kept a few and that these disappeared about 1956. Another possible source seems to have been the Ham gravel pits, which were filled in in 1955, about eight miles away to the North East. Although this distance is rather large, it is possible that the move was aided by persons interested in preserving the frogs from the filling-in operations at Ham.

In the meanwhile, Esher Council in June, 1959, announced plans for the dredging of the pond during the coming winter to render it more suitable for swimming. The pond was drained in October and remained empty throughout the winter thus probably ruining the hibernation of the frogs. The actual dredging did not start until the end of May, 1960; thus the pond remained empty during the potential breeding season. By mid-July the dredging was completed and the sluice gate shut. The pond was partly filled and was then redrained. It was about half full at the end of August.

Since the dredging did not affect the Eastern end it had been hoped that the frogs would have found refuge in the inflow stream. However, since this ditch has now also been cleaned out this hope is but a feeble one. There have been no reports of frogs in the area of Black Pond this year. There is one unconfirmed report of an Edible frog at Oxshott Claypit (T.Q.135602) last year.

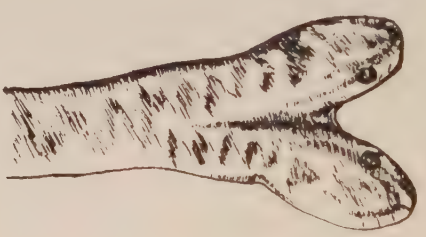
*National Grid reference.

A CASE OF DICEPHALISM IN THE ADDER

By

J. W. Steward

A female Adder (*Vipera b. berus*) which I caught at Burnham Beeches in Buckinghamshire during August, 1960, was handed over to Mr. W. M. Fitzsimmons of the Commonwealth Bureau of Helminthology in St. Albans for examination for internal parasites. The examination disclosed no parasites of any kind, but it was found that the snake contained seven fully-developed young, six of which were normal whilst the seventh had two separate heads. The heads, which were themselves complete and normal in every way, were side by side with the ventral surfaces inclined towards each other at an angle of about 30 degrees. They were joined to the common body in such a way that while the point of fusion of the skin between the heads was only just behind the eyes, the forking of the vertebral column was obviously some further back, probably some seven or eight vertebræ behind the heads. The accompanying sketch shows the position more clearly.



The six normal young ranged between 14.4 and 14.9 cms. in total length, but the abnormal specimen was considerably smaller, the total length being only 12.4 cms. while the heads were also noticeably smaller than those of the normal young.

I can find no record in the literature of a similar condition having previously been observed in *Vipera berus*, although it has been recorded in other species.* Schmidt and Inger, 1957 ("Living Reptiles of the World," Hamish Hamilton Ltd., London) published a photograph of a two-headed California King Snake (*Lampropeltis getulus californiæ*) in which the condition is apparently identical with that of the present specimen, except that there is little or no inclination of the ventral surfaces of the heads towards each other.

The parent snake and the seven young are preserved in the writer's collection and open to inspection.

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* B. Cunningham gives a bibliography of records of double monstrosities in snakes in his book *Axial bifurcation in serpents* (publ. Duke University Press, N. Carolina, 1937). He reproduces photographs of a *Vipera berus* with two tails, and a *V. aspis* with two heads, and also mentions two examples of double-headed adders.

—Editor.

PHRYNOSOMA CORNUTUM, CAUSE OF DEATH

By

E. Elkan

A fully grown male specimen was sent in by a member. Autopsy vealed an empty intestinal canal with the exception of the stomach, which as filled with nematode worms. Dr. Inglis (Brit. Mus. Nat. Hist.) was nd enough to specify these as *Skrabinoptera phrynosoma*, a common para- te of the horned toad (see S. H. Lee, J. Parasitol, 1957, **43**, 66). This orm is commonly found in the stomach of these lizards. The profusion of orms in this case may have prevented the lizard from feeding and it was bviously starved when it died.

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EST AFRICAN SNAKES: by G. S. Cansdale. Longmans, London, 1961. 74 pp., 15 coloured plates.

his new book by Cansdale, issued as one of the series of "West African ature Handbooks", can well be recommended to the general herpetologist. he author draws freely upon the experience of many years in West Africa nd his first-hand accounts of the 40 or so species described in the book are ealistic and vivid to an unusual degree. Apart from two short chapters of a eneral nature and one on the prevention and treatment of snake-bite, the ook is entirely concerned with the very interesting snake fauna of West frica and is detailed enough to serve as a fairly good handbook for the rea.

One of the main attractions of the book is the series of coloured plates, overing 33 species. These are beautifully drawn and coloured and entirely dequate to identify most of the species at a glance.

The confirmed taxonomist will find himself occasionally in doubt as the precise identity of species casually mentioned only by a popular ame, but in most cases the scientific name is also given and with few xceptions the classifications are accurate and up-to-date.

No published price appears on the book but I paid 9s. 6d. for my copy Harrods and at this price I imagine every herpetologist will think the ook well worth having.

J. W. Steward.

HE ECOLOGY AND LIFE HISTORY OF THE COMMON FROG (RANA TEMPORARIA TEMPORARIA): by R. Maxwell Savage. Sir Isaac Pitman & Sons, London. 1961. 221 pp. Price 25s.

he practice of writing a whole book about a single animal is becoming creasingly common among ecologists, and a very welcome practice it is. ere in a conveniently sized and attractively produced volume, Dr. Savage as given us a compendium on the natural history of the common frog, lly documented and written in a style that is both lucid and individual. he author's personality comes across on every page, but it is never lowed to get between the reader and the facts.

The entire life-history of the frog from egg to adult is covered. There is a particularly illuminating account of the ecological importance of the jelly envelope of frogs' spawn in the light of its chemical and physical properties, a subject on which Dr. Savage has done much original research. Later chapters deal with the tadpoles and their ecology, and some of the adaptations of the digestive and respiratory organs to the methods of feeding and breeding. It is a pity that Dr. I. Griffith's important study on the form and function of the foregut in anuran larvæ should have appeared too recently for discussion here. The remainder of the book is largely devoted to the adult frog, especially to its distribution, food, hibernation and breeding habits, and there is a long final chapter on the use of statistical (and other) methods in ecology.

The book is packed with interesting observations many of which are unfamiliar, at least to the reviewer; for example, the observation that the short-lived external gills of tadpoles are an adaptation to breeding at the surface film when the creatures are living in the oxygen-poor environment of a mass of decomposing egg-jelly, and that the nuptial pad on the thumb of the adult male is used primarily for wrestling with other males and not for holding the female in amplexus.

Dr. Savage has written a book which is both informative and stimulating, and which, I suspect, will be read with pleasure and profit by all who study frogs for many years to come.

A. d'A. Bellairs.

DISEASES OF COLD-BLOODED ANIMALS

It is useful sometimes to look across the borders of the national literature. Particularly so in matters of herpetology the bibliography of which is deplorably scanty so far as popular books are concerned. But of all the subjects that might interest the amateur keeper of cold-blooded animals the one most neglected is that of their diseases and their treatment. We may therefore welcome the news that the publishers of the German Journal for Aquaria and Terraria are in the process of publishing small comprehensive volumes on this subject. The first of these has just appeared (H. H. Reichenbach-Klinke, Krankheiten der Aquarienfische. A. Kernen publ. Stuttgart, 1957. Price DM 15,60 or approx. 30/-. pp. 215 with 117 illustrations). Although this book deals mainly with those fish commonly kept by the amateur aquarist, its study would by no means be wasted on the herpetologist since most of the general principles governing health and diseases apply at least to fish and amphibia equally well. The seven chapters cover: (1) the technique of investigation, (2) diseases caused by parasites, (3) non-parasitical diseases, (4) diseases with various other causes, (5) biological factors in the morbidity of fish, (6) The diagnosis, and (7) The treatment. The text is clear and intelligible for the advanced amateur. The interpretation of some of the photomicrographs will need a very advanced reader indeed. But for anybody who takes his hobby at all seriously this book should be more than welcome. We are glad to hear that a second volume on amphibia and their diseases and perhaps a third dealing with the reptiles is to follow.

E. Elkan.

REVIEWS

THE WORLD OF AMPHIBIANS AND REPTILES: by ROBERT MERTENS. George G. Harrap & Co., Ltd., London, 1960 (English Translation). 207 pp., 140 photographs. Price 3 guineas.

The authors' aim in preparing this book has obviously been to make it appeal as much as possible to a wide range of readers, from the expert herpetologist to the interested layman, and as such it is to some extent necessarily a compromise, almost too generalised for the one and too detailed for the other.

Having said this, all further description is simply a matter of choosing the right superlatives. To use the vernacular of our day, the book has "the lot". The author is internationally known as one of the greatest living herpetologists, and there is no disputing the accuracy of his information. The form of presentation of the material—divided into separate chapters on such subjects as geographical distribution, food and feeding, sex and reproduction—is excellent for a work of this kind, and the approach to these various subjects bears the hallmark of the pioneering expert. The book is handsomely printed and bound, and the photographs are extremely good. Particular mention must be made of the 31 coloured plates, which are quite magnificent. Many of the photographs are of comparatively rare species.

For anyone who likes amphibians and reptiles and can afford the price, this is a book to keep handy and browse through whenever life gets a little dull.

J. W. STEWARD.

Vol. 1 No. 1 of the BHS JOURNAL

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Will any member of the Society willing to sell or exchange white axolotls kindly communicate with the editor.